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April 2016

HUFA76407DK8T_F085

Dual N-Channel Logic Level UltraFET® Power MOSFET

60 V, 3.5 A, 105 mΩ

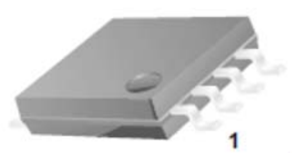
General Description

These N-Channel power MOSFETs are manufactured using the innovative UltraFET® process. This advanced process technology achieves the lowest possible onresistance per silicon area, resulting in outstanding performance. This device is capable of withstanding high energy

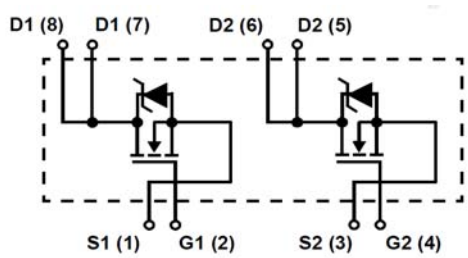
in the avalanche mode and the diode exhibits very low reverse recovery time and stored charge. It was designed for use in applications where power efficiency is important, such as switching regulators, switching convertors, motor drivers, relay drivers, low-voltage bus switches, and power management in portable and battery-operated products.

Features

- Ultra-Low On-Resistance $r_{DS(on)}$ = 0.090Ω at V_{GS} = 10 V
- Ultra-Low On-Resistance $r_{DS(on)}$ = 0.105Ω at V_{GS} = 5 V
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- Transient Thermal Impedance Curve vs Board Mounting Area
- Switching Time vs R_{GS} Curves
- Qualified to AEC Q101
- RoHS Compliant



SO-8



MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage	(Note 1)	60	V
V_{DRG}	Drain to Gate Voltage (R_{GS} = 20kΩ)	(Note 1)	60	V
V_{GS}	Gate to Source Voltage		±16	V
I_D	Drain Current -Continuous (T_A = 25 °C, V_{GS} = 5V)	(Note 2)	3.5	A
	-Continuous (T_A = 25 °C, V_{GS} = 10V) (Figure 2)	(Note 2)	3.8	
	-Continuous (T_A = 100 °C, V_{GS} = 5V)	(Note 3)	1	
	-Continuous (T_A = 100 °C, V_{GS} = 4.5V) (Figure 2)	(Note 3)	1	
I_{DM}	Drain Current -Pulsed		Figure 4	
UIS	Pulsed Avalanche Rating		Figures 6, 17, 18	
P_D	Power Dissipation	(Note 2)	2.5	W
	Derate Above 25 °C		20	mW/°C
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +150	°C
T_L	Temperature for Soldering - Leads at 0.063in (1.6mm) from Case for 10s		300	°C
T_{pkg}	Temperature for Soldering - Package Body for 10s, See Techbrief TB334		260	°C

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
76407DK8	HUFA76407DK8T_F085	SO-8	330mm	12mm	2500 units

Notes:
1. T_J = 25 °C to 125 °C.
2. 50°C/W measured using FR-4 board with 0.76 in^2 (490.3 mm^2) copper pad at 1second.
3. 228°C/W measured using FR-4 board with 0.006 in^2 (3.87 mm^2) copper pad at 1000 seconds.
4. A suffix as "…F085P" has been temporarily introduced in order to manage a double source strategy as Fairchild has officially announced in Aug 2014.

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units

Off Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA V_{GS} = 0 V	(Figure 12)	60	-	-	V
			T_A = -40 °C(Figure 12)	55	-	-	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 55 V, V_{GS} = 0 V		-	-	1	μA
			T_A = 150 °C	-	-	250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±16 V		-	-	±100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, I_D = 250 μA (Figure 11)	1	-	3	V
$r_{DS(on)}$	Static Drain to Source On Resistance	I_D = 3.8 A, V_{GS} = 10 V (Figure 9,10)	-	0.075	0.090	Ω
		I_D = 1.0 A, V_{GS} = 5 V (Figure 9)	-	0.088	0.105	
		I_D = 1.0 A, V_{GS} = 4.5 V (Figure 9)	-	0.092	0.110	

Thermal Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	0.76in² (490.3mm²) Pad (Note 2)	-	-	50	°C/W
		0.027in² (17.4mm²) Pad (Figure 23)	-	-	191	
		0.006in² (3.87mm²) Pad (Figure 23)	-	-	228	

Switching Characteristics (V_{GS}=4.5V)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t_{on}	Turn-On Time	V_{DD} = 30 V, I_D = 1.0 A, V_{GS} = 4.5 V, R_{GS} = 27 Ω (Figure 15, 21, 22)	-	-	57	ns
$t_{d(on)}$	Turn-On Delay Time		-	8	-	ns
t_r	Rise Time		-	30	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	25	-	ns
t_f	Fall Time		-	25	-	ns
t_{off}	Turn-Off Time		-	-	75	ns

Switching Characteristics (V_{GS}=10V)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t_{on}	Turn-On Time	V_{DD} = 30 V, I_D = 3.8 A, V_{GS} = 10 V, R_{GS} = 30 Ω (Figure 16, 21, 22)	-	-	24	ns
$t_{d(on)}$	Turn-On Delay Time		-	5	-	ns
t_r	Rise Time		-	11	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	46	-	ns
t_f	Fall Time		-	31	-	ns
t_{off}	Turn-Off Time		-	-	116	ns

Gate Charge Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 to 10 V	V_{DD} = 30 V, I_D = 1.0 A, $I_{g(REF)}$ = 1.0 mA, (Figure 14, 19, 20)	-	9.4	11.2	nC
$Q_{g(5)}$	Gate Charge at 5V	V_{GS} = 0 to 5 V		-	5.3	6.4	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0 to 1 V		-	0.42	0.5	nC
Q_{gs}	Gate to Source Charge			-	1.05	-	nC
Q_{gd}	Gate to Drain "Miller" Charge			-	2.4	-	nC

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1MHz, (Figure 13)	-	330	-	pF
C_{oss}	Output Capacitance		-	100	-	pF
C_{rss}	Reverse Transfer Capacitance		-	18	-	pF

Drain-Source Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{SD}	Source to Drain Diode Forward Voltage	I_{SD} = 3.8 A	-	-	1.25	V
		I_{SD} = 1.0 A	-	-	1.00	
t_{rr}	Reverse Recovery Time	I_F = 1.0 A, di/dt = 100 A/μs	-	-	48	ns
Q_{rr}	Reverse Recovery Charge		-	-	89	nC

Typical Characteristics T_J = 25°C unless otherwise noted

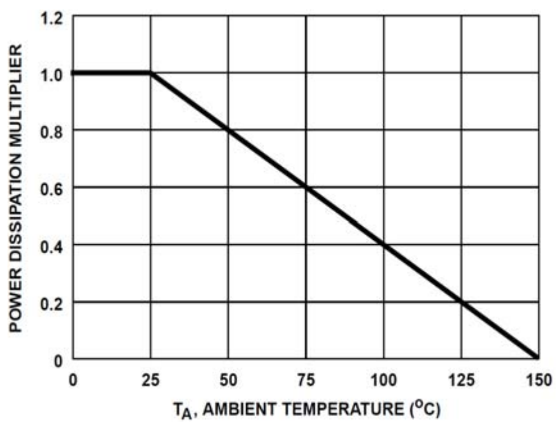


Figure 1. NORMALIZED POWER DISSIPATION vs. AMBIENT TEMPERATURE

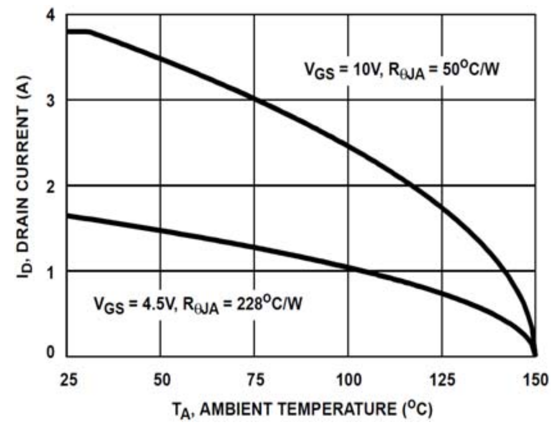


Figure 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs. AMBIENT TEMPERATURE

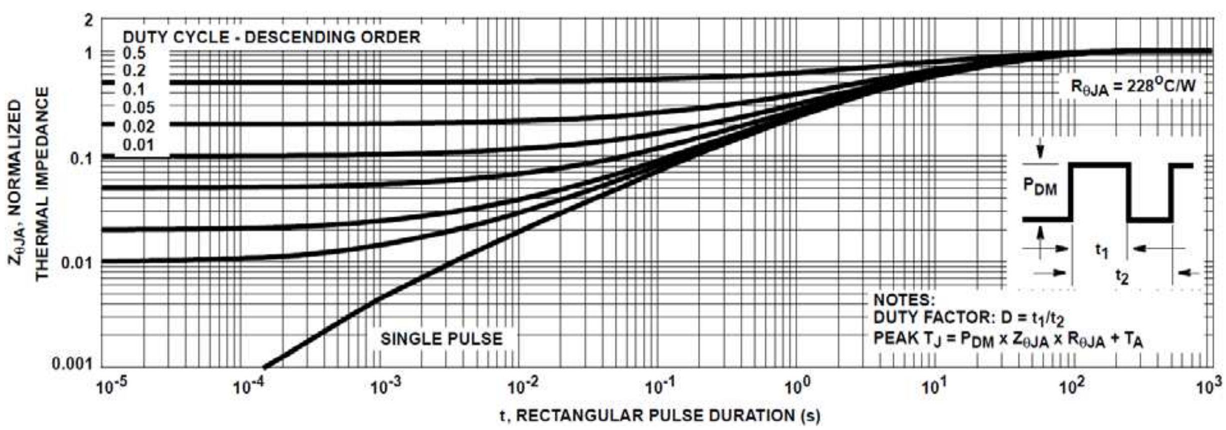


Figure 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

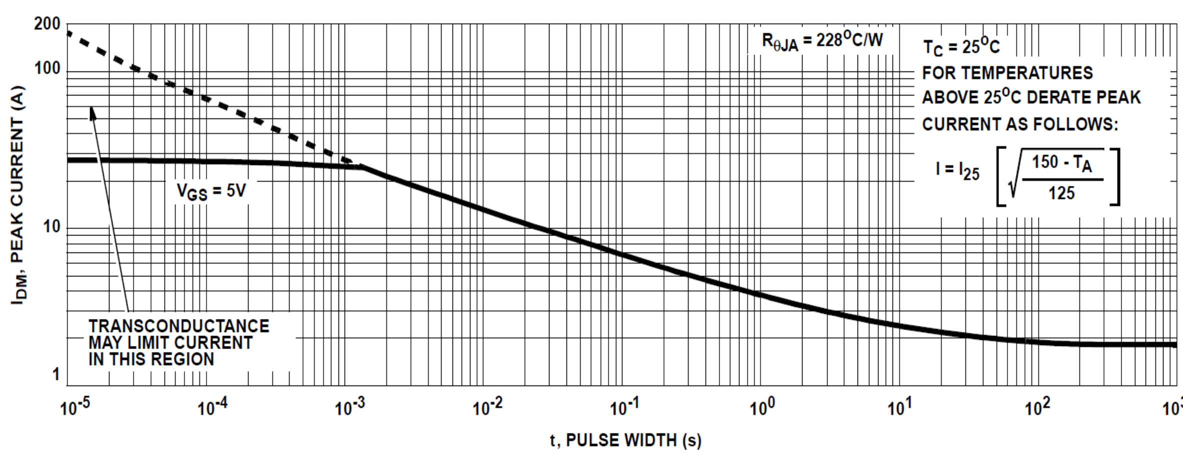


Figure 4. PEAK CURRENT CAPABILITY

Typical Characteristics $T_J = 25°C$ unless otherwise noted

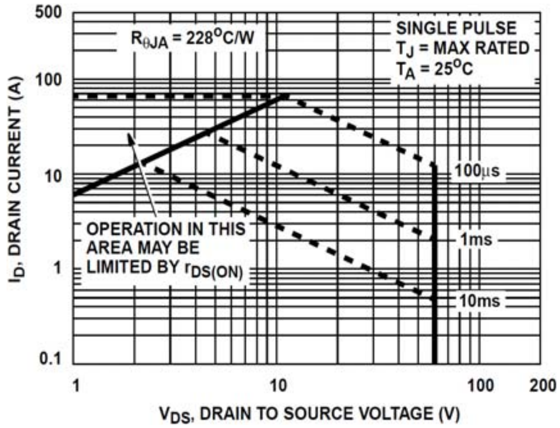


Figure 5. FORWARD BIAS SAFE OPERATING AREA

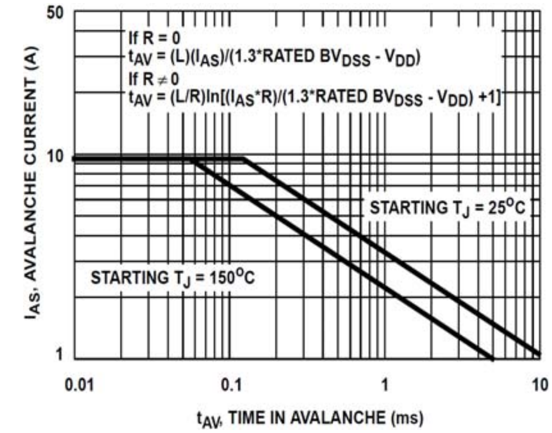


Figure 6. UNCLAMPED INDUCTIVE SWITCHING CAPABILITY

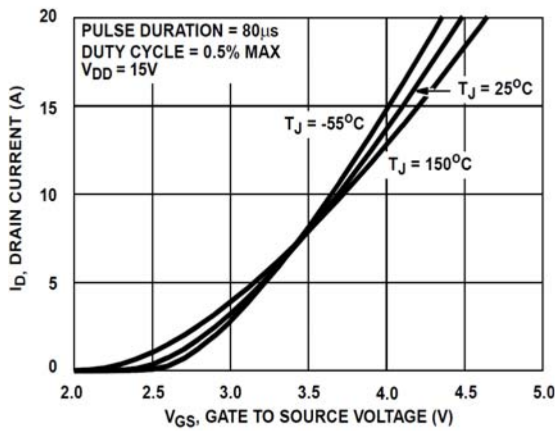


Figure 7. TRANSFER CHARACTERISTICS

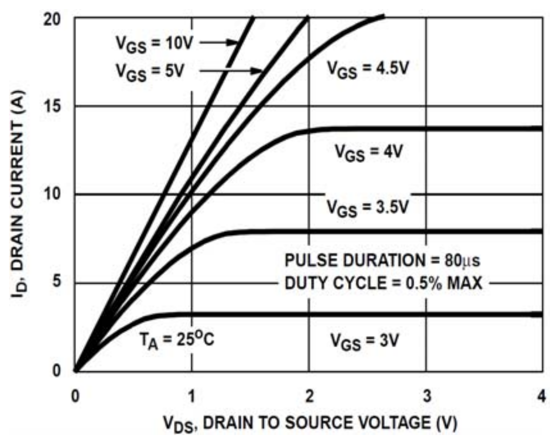


Figure 8. SATURATION CHARACTERISTICS

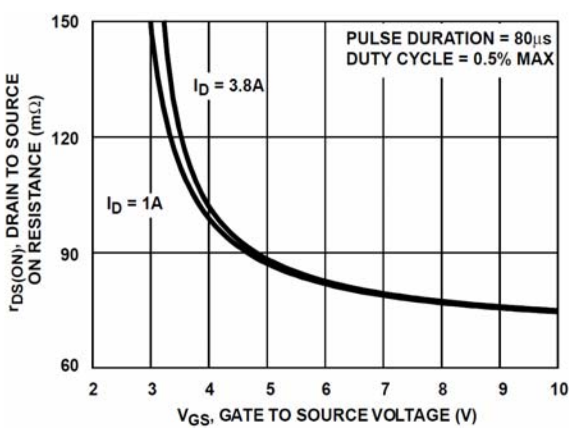


Figure 9. DRAIN TO SOURCE ON RESISTANCE vs GATE VOLTAGE AND DRAIN CURRENT

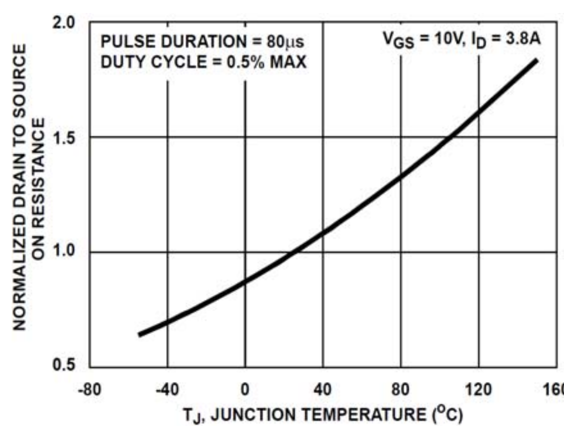


Figure 10. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

Typical Characteristics T_J = 25°C unless otherwise noted

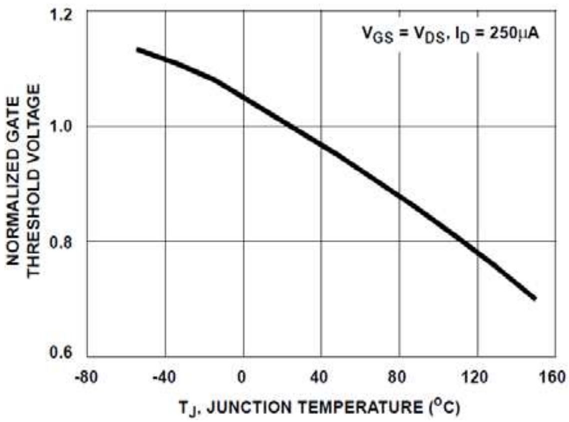


Figure 11. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

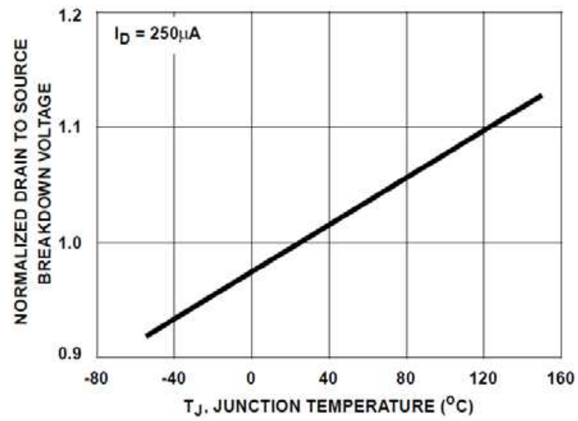


Figure 12. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE

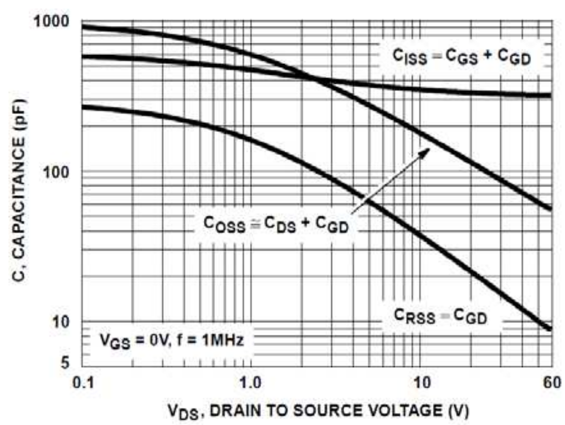


Figure 13. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE

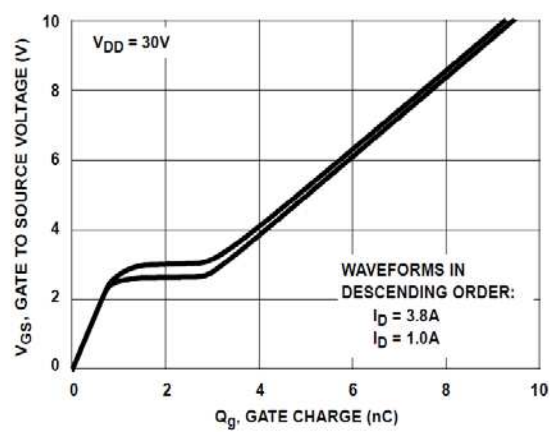


Figure 14. GATE CHARGE WAVEFORMS FOR CONSTANT GATE CURRENT

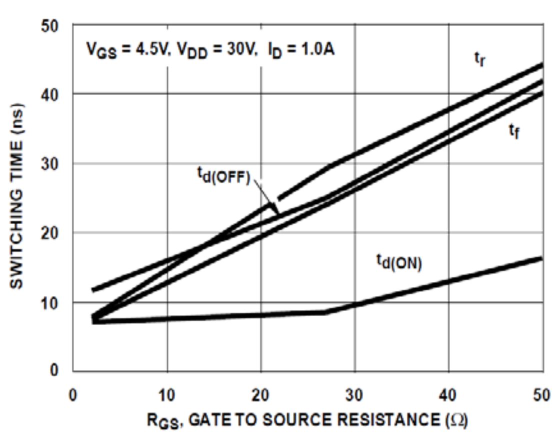


Figure 15. SWITCHING TIME vs GATE RESISTANCE

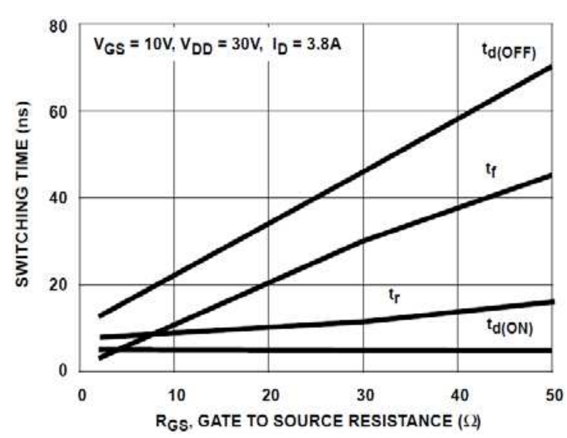
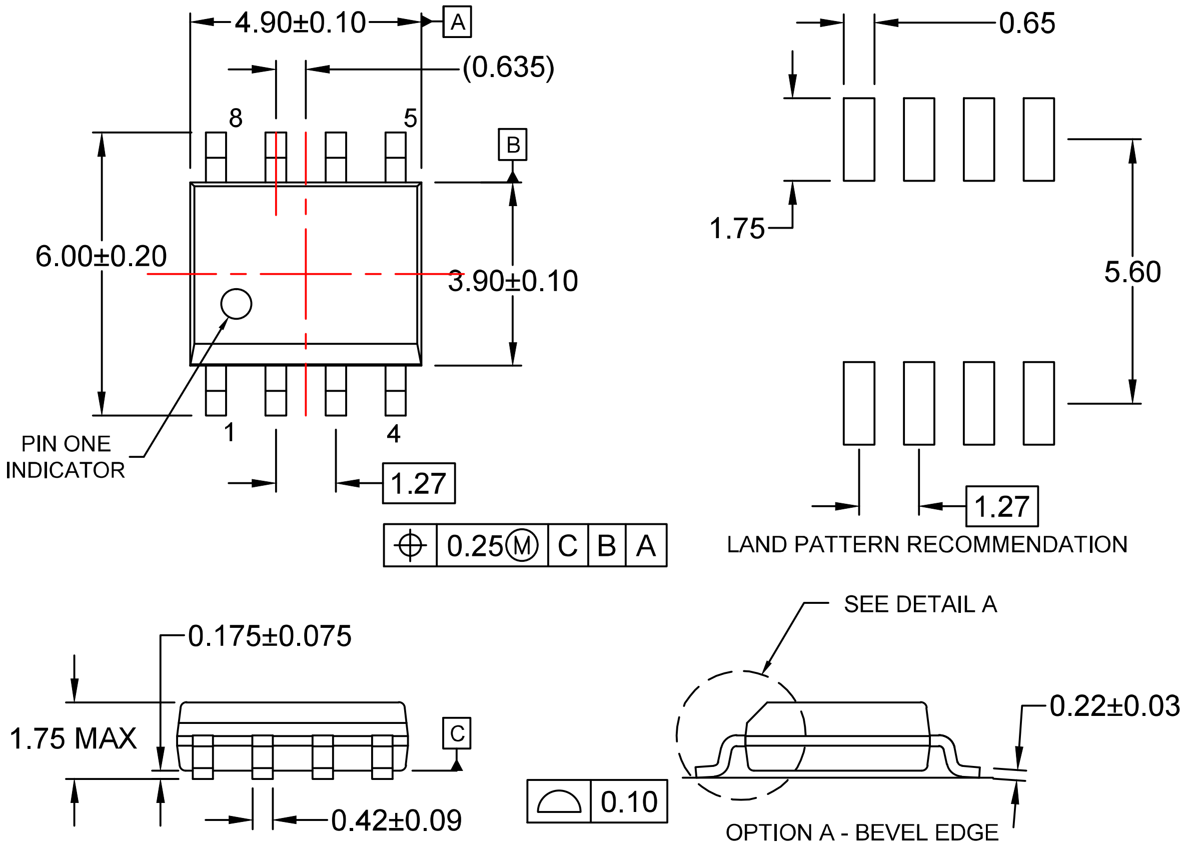
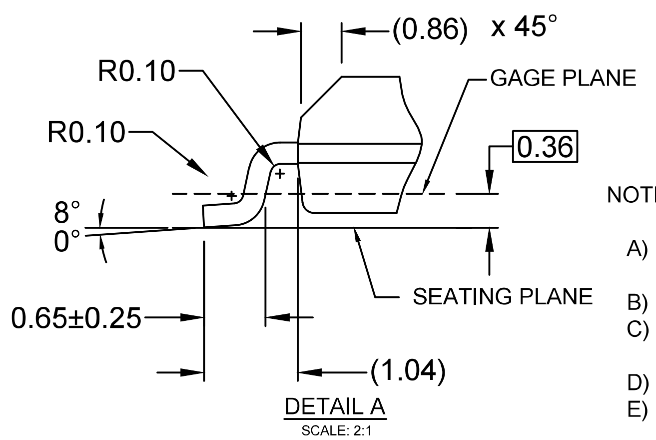
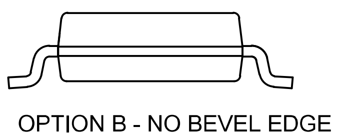


Figure 16. SWITCHING TIME vs GATE RESISTANCE







NOTES:

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